epiTRENDS

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Evaluating Surveillance for Laboratory-Confirmed Influenza Deaths

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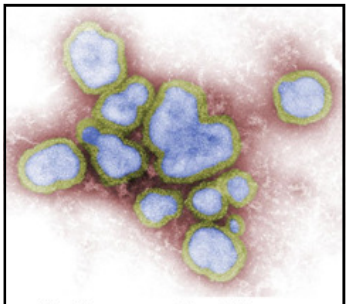
Evaluation is a critical but challenging component of public health surveillance. During the 2009 influenza pandemic, laboratory-confirmed influenza deaths were made notifiable in Washington State. The Department of Health (DOH) Communicable Disease Epidemiology Section used capture-recapture methods to assess the sensitivity of influenza death reporting by comparing cases in the Public Health Issues Management System (PHIMS) with reports in the death registry.



Influenza A virions
Colorized electron micrograph (TEM)
Photo courtesy of CDC
F.A. Murphy

Public Health Discussion Points

Here are three discussion points related to evaluation of influenza death reporting. The answers are contained in the text, or you may refer to answers at the end of this article.

1. What attributes make PHIMS the currently preferred method for influenza death case finding and surveillance?
2. What cautions should be considered when querying text fields within the death registry?
3. What actions can local health jurisdictions and providers take to enhance detection of laboratory-confirmed influenza deaths?

Influenza death reporting in 2009

In April 2009, a novel influenza strain was recognized in California and Mexico and subsequently identified in Washington and most other states. A pandemic rapidly developed, eventually affecting most of the world. Although originally referred to as a "swine flu", the strain incorporated avian, swine, and human elements. Clinical characteristics of infections were initially unknown but there were concerns regarding the potential illness severity based on elevated mortality during previous influenza pandemics. One unknown characteristic of the new strain was the case fatality rate as well as characteristics of fatal cases.

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In response to the pandemic, healthcare providers and hospitals in Washington were required to report deaths due to laboratory-confirmed H1N1 influenza from April through August 2009. Deaths due to laboratory-confirmed influenza of any type were notifiable from September through December 2009.

Data systems

In Washington State, local health jurisdictions receive reports of notifiable conditions and conduct public health case investigations. Cases reports are electronically transmitted from local health jurisdictions to DOH through PHIMS, a secure web-based application for disease surveillance.

In order to evaluate the sensitivity of influenza deaths reported through PHIMS, we compared deaths reported through PHIMS to influenza deaths identified by death certificate review. Six counties in Washington transmit death certificates electronically to DOH; these records enter the registry within seven days. The remaining counties submit paper death certificates to DOH, which typically take more than 60 days to enter the registry. It is anticipated that all death certificates in the state will be electronically transmitted to DOH during 2011.

Death certificates include multiple diagnoses but no confirming evidence such as laboratory test results. Text descriptions of the causes of death are coded using ICD-10 (International Classification of Diseases) classifications. The death certificate registry records causes of deaths in both text and coded fields. For this study, influenza death was defined as a death certificate with codes J09 or J10, indicating identified influenza, or text indicating influenza listed among any of the diagnoses. Records were manually examined and those considered a suspect or probable diagnoses based on text were excluded.

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Capture-recapture method

A previous EpiTRENDS article discussed the capture-recapture method for estimating the sensitivity of a surveillance system or case finding method (December, 2010: http://www.doh.wa.gov/EHSPHL/epitrends/10-epitrends/10-12-epitrends.htm). Briefly, the method compares numbers of cases of a condition reported to two or more independent surveillance systems. Each system is assumed to include only a part of the total number of cases that occurred. The number of cases detected by each system and the extent of overlap can be used to estimate the actual total number of cases.

During April through December 2009 in Washington, only 63 influenza-related deaths were identified in both PHIMS and the death registry; 31 were noted in PHIMS only; and 26 were noted in the death registry only. Applying capture-recapture methods, we estimate that 133 laboratory-confirmed influenza deaths

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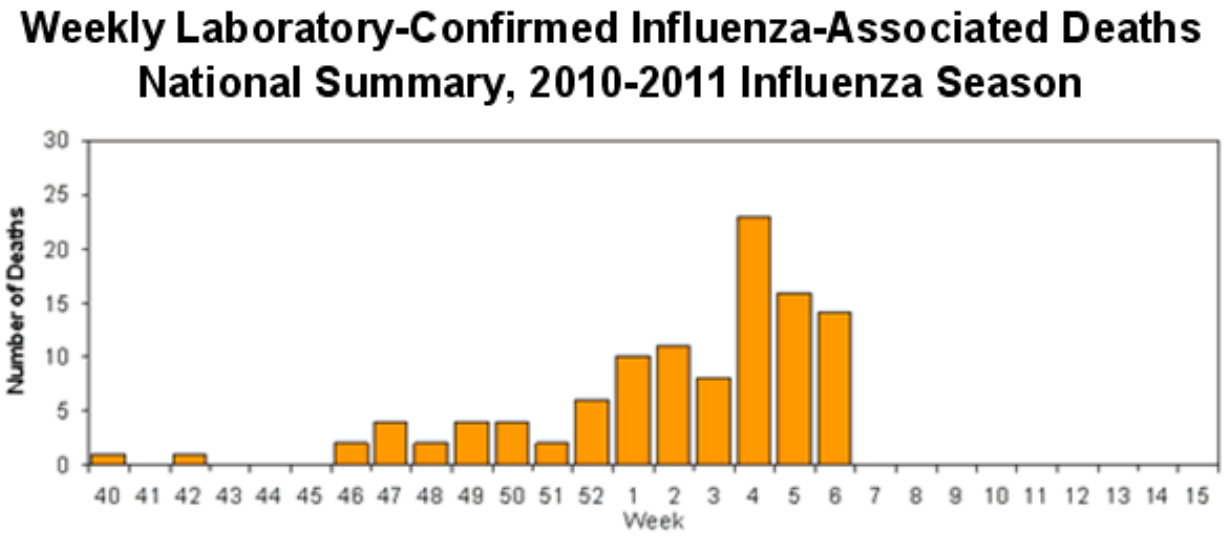
due to pandemic influenza virus occurred during this time period in Washington. Using these systems to supplement each other, the two sources would have captured 120 cases (90% of estimated cases).

Of 94 laboratory-confirmed influenza deaths reported through PHIMS, 31 cases (33%) would not have come to the attention of DOH if surveillance relied solely on death certificates. These records were identified and reviewed. Of the 31, death certificates for six noted "Influenza, virus not identified" (ICD-10 J11); all six were laboratory-confirmed according to PHIMS. In the remaining 25 lab-confirmed influenza cases, a diagnosis related to influenza was not present on the death certificate; 12 (48%) indicated pneumonia within literal phrases and were coded as 'diseases of the respiratory system' and five (20%) were coded as 'diseases of the circulatory system'. The remaining 8 death certificates (32%) had no mention of influenza, pneumonia, cardiopulmonary disease, or respiratory failure as the primary or contributory cause of death.

Of 89 influenza-related deaths reported in the death registry, 26 (29%) would not have come to the attention of DOH if surveillance relied solely on PHIMS. Unfortunately, we do not know what proportion of cases had confirmatory laboratory testing and were not reported to PHIMS. Of these 26, six (23%) were reported to PHIMS as confirmed (4 cases), probable (1), or suspect (1) influenza cases but death was not noted. No pediatric fatal cases or fatal cases among pregnant women were found among the 20 remaining death certificates which were not in PHIMS.



In summary, using death certificate data and capture-recapture methods, PHIMS likely captured about 70% of the laboratory-confirmed influenza deaths that occurred during the pandemic. Although this is an underestimate of the laboratory-confirmed influenza deaths, a review of cases that were identified by death certificate review alone did not suggest any qualitative differences from those fatal cases reported to PHIMS or presence of other at-risk groups.

In addition to sensitivity of reporting, surveillance systems have other attributes. Reporting of influenza deaths through PHIMS was timely, with reports received at DOH within a day of

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initial notification. PHIMS reports were complete (measured by completeness of variables) with the exception of pregnancy status (79% complete) and ethnicity/race (84% complete). Adding periodic death registry review to reporting through PHIMS would increase case finding for influenza deaths, while promoting the reporting of influenza-associated deaths by health care providers and health care facilities will also contribute to surveillance efforts.

On February 5, 2011, laboratory-confirmed influenza deaths became permanently notifiable in Washington State by health care providers and health care facilities as part of a revision of the Washington Administrative Code (WAC) for notifiable conditions. Novel or unsubtypable influenza is also reportable by providers, facilities, and clinical laboratories. Timely reporting of cases and accurate entries on death certificates will improve the surveillance data. Providers should contact the local health jurisdiction promptly for assistance with obtaining prompt testing for deaths when influenza is suspected.

Answers to Public Health Discussion Points

1. Notifiable condition reporting through PHIMS is currently more timely than death certificate review in most Washington counties. Additionally, PHIMS captures clinical information and influenza laboratory test results which provide data on risk factors and supporting evidence for cause of death.
2. When querying death records by text field, there are multiple caveats. For example, if records are searched for 'influenza' then those containing the text 'not influenza' will be included. We manually reviewed records and eliminated those containing text contradicting the condition. Additionally, misspellings and typos must be considered so that records are not overlooked (e.g., H1 read as HI or H!).
3. Local health jurisdictions should ensure providers are aware of testing available for suspected influenza deaths through Washington State Public Health Laboratories (PHL), free of charge. A provider suspecting influenza as cause of death must contact the local health jurisdiction and obtain a specimen as soon as possible following death. It is important that providers and local health jurisdictions are as accurate as possible in data collection and recording.

Additional Resources

The new notifiable conditions rule is available at:
http://apps.leg.wa.gov/wac/default.aspx?cite=246-101

Influenza virus testing at Washington State Public Health Laboratories (PHL) guidelines available at: http://www.doh.wa.gov/ehsphl/epidemiology/cd/swineflu/speccollecttrans.pdf

A CDC discussion of influenza-associated deaths is available at:
http://www.cdc.gov/flu/about/disease/us_flu-related_deaths.htm